# ANNUAL INTERNAL WASTE STREAM DISCHARGE REPORT AND CERTIFICATION FOR BUILDING 374 FOR CALENDAR YEAR 2002

U.S. Department of Energy
Kaiser-Hill Company, L.L.C.
Rocky Flats Closure Sites Services, L.L.C.

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# ANNUAL INTERNAL WASTE STREAM DISCHARGE REPORT AND CERTIFICATION FOR BUILDING 374 FOR CALENDAR YEAR 2002

## I. INTRODUCTION

The Rocky Flats Environmental Technology Site's (RFETS or the Site) National Pollutant Discharge Elimination System (NPDES) permit requires an annual report of waste streams sent for treatment at the Process Waste Treatment Facility, B374, and the Wastewater Treatment Plant, B995. Part III Section I of the permit requires:

> In addition, the permittees shall submit an annual report to both EPA and the State of Colorado summarizing the status of non-sanitary wastewaters going to the sewage treatment plant and to Building 374 during the calendar year. The wastewaters shall be listed separately for the sewage treatment plant and for Building 374. The report shall list the building from which the wastewater originates; briefly describe the nature of the wastewater; provide a listing of the pollutants of concern; briefly describe any pretreatment of the wastewater; and give the approximate annual volume of the wastewater, in gallons. This would include routine internal waste streams such as blowdown water from cooling towers in which chemical additives other than chlorine, inorganic acids, and inorganic bases (e.g., sulfuric acid, sodium hydroxide, etc.) are used. The annual report shall be in the form of a letter with attachments and shall be submitted by no later than April 1 of the following year. This reporting shall include an estimate of infiltration and inflow rates in the collection system, and an evaluation of the possible detrimental effect of this dilution on the treatment system performance.

In addition to the reporting of internal discharges to the treatment facilities, the permit also has a specific annual requirement for B374. Part I of the permit requires:

> The permittee shall submit an annual report to both EPA and the State of Colorado Department of Public Health and Environment summarizing the results of analyses of such monitoring during the calendar year, including the following calculation regarding conductivity of the discharge:
>
> i. the maximum conductivity observed during each month;
> ii. the time-weighed [sic]average conductivity during each month;
> iii. the number of times the conductivity exceeded 150 umhos/cm at 25°C for a duration of more than 5 minutes during each month;
> iv. if the conductivity exceeded 150 umhos/cm at 25°C for a duration of more than 5 minutes; give the longest period of time during each month; and,
> v. the total length of time the conductivity exceeded 150 umhos/cm at 25°C during each month.
>
> In addition, the annual report shall include an annual certification that the evaporator effluent has met the quality requirements for the "commercial product" Resource Conservation Recovery Act (RCRA) exclusion described in 40 CFR Section 261.2(e)(1)(ii) during the previous calendar year. The annual report shall be in the form of a letter with attachments and shall be submitted by no later than April 1 of the

following year.

## II. REPORT CONTENTS

This report has three sections: 1) The Building 374 Annual Discharge Certification and Influent Waste Streams Report, which contains effluent monitoring, commercial product certification, and a listing of the waste streams accepted for treatment at B374, 2) a list of routine internal waste streams accepted at B995, and 3) an evaluation of infiltration and inflow into the sanitary collection system and potential impacts on the unit processes at B995.

Each section contains a separate certification statement, based on the specific permit requirements, as described in the introduction. The certification for section 1 includes the routine certification statement required by Part IV Section G.4. of the NPDES permit, as well as specific language certifying that the product water from B374 meets the RCRA requirements for "commercial reuse" based on effluent monitoring. Sections 2 and 3 contain the routine certification set forth in the permit.

## III. SUMMARY

This report confirms that the requirements to screen organic constituents from B374 has been met, lists waste streams accepted by the treatment facilities at Buildings 374 and 995, and provides an evaluation of the impacts of infiltration and inflow at B995. That evaluation presents flow and precipitation information for 2002. This year, Colorado experienced a severe drought, resulting in only a 6% increase in flow during storm events. As reported last year, it is apparent that infiltration and inflow do not adversely impair biological treatment in the unit processes.

# SECTION 1

## BUILDING 374 ANNUAL DISCHARGE CERTIFICATION AND INFLUENT WASTE STREAMS

# CERTIFICATION STATEMENT FOR THE BUILDING 374 ANNUAL DISCHARGE CERTIFICATION AND INFLUENT WASTE STREAMS

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

I further certify that the evaporator effluent has met the quality requirements for the "commercial product" Resource Conservation and Recovery Act (RCRA) exclusion described in 40 CFR 261.2(e)(1)(ii) during the reporting period.

KTrice

Kelly Trice
Vice President and Project Manager
371/374 Project
Kaiser Hill Company, L.L.C.

2/27/03

Date

# BUILDING 374 ANNUAL DISCHARGE CERTIFICATION AND INFLUENT WASTE STREAMS

During calendar year 2002 the Building 374 evaporators operated in January and March. After that time the evaporators were shut down in preparation of decommissioning, decontamination, and demolition, therefore this will be the last annual report as required under NPDES permit Part I.C.4. for Internal Outfall 014, B374 evaporators.

In accordance with permit requirements, during the periods of routine operation, product water was sampled to demonstrate that the water quality was sufficient to meet the commercial product definition. The tables that follow present a summary of B374 operations, the volume of product water produced, and the results of samples collected during the periods of continuous operation.

The NPDES permit also requires specific accounting for evaporator product water which exceeds a conductivity of 150 micromhos/cm. Table 1 shows the maximum and monthly average conductivity values for the months for which there was continuous operation. At no time did product water exceed the 150 micromhos/cm limitation.

Table 2 presents the results of metals analyses in the product water. As shown, none of the results exceeds the corresponding MCLs for drinking water for those parameters for which MCLs have been established by EPA.

Tables 3 and 4 present the results of analyses for organic parameters, both volatile and semivolatile. Virtually all of the results are non-detects. In accordance with Part 1.C.3 of the NPDES permit, the Site has established a procedure to "screen out" wastewater influents which contain organic constituents. As provided in the permit, the results in Tables 3 and 4 demonstrate the "adequacy of the screening program."

Finally, Table 5 presents a summary of the wastestreams accepted for treatment during calendar year 2002. Part III.I of the NPDES permit requires that this report *"list the building from which the wastewater originates; briefly describe the nature of the wastewater; provide a listing of the pollutants of concern; briefly describe any pretreatment of the wastewater; and give the approximate annual volume of the wastewater, in gallons."* Table 5 lists the sources, nature of the wastewater and the approximate volumes. For all wastewaters transferred to B374 for treatment, the parameters of concern are primarily radionuclides. None of the wastes received pretreatment (Note that a waste stream from B371 is generated by the Caustic Waste Treatment system; this is a RCRA-permitted treatment unit and is not considered pretreatment).

# TABLE 1

## SUMMARY OF PRODUCT WATER PRODUCTION AND QUALITY

| | Months of Operation 2002 | | | | |
|---|---|---|---|---|---|
| | January | March | 2002 Total | | |
| **Product Water, Gallons** | 171,599 | 42,839 | 214,438 | | |
| | | | | | |
| | Monthly Average Concentration, mg/L | | | | |
| **Inorganic Parameters** | | | **Ave** | **Max** | **MCL** |
| Ammonia as N | 0.32 | 10.9 | 5.61 | 10.9 | |
| Total Nitrate/Nitrite as N | 0.97 | 0.056 | 0.513 | 0.97 | 10 |
| Total Phosphorus | 0.052 | 0.026B | 0.039 | 0.052 | |
| Total Ortho Phosphorus | | | | | |
| Conductivity mS/cm (highest) | 136 | 150 | | 150 | |
| mS/cm (ave) | 46 | 91 | 68.5 | 91 | |
| Number of times above 150 | 0.00 | 0.00 | 0.00 | | |
| Longest period above 150 | 0.00 | 0.00 | 0.00 | | |
| Total time above 150 | 0.00 | 0.00 | 0.00 | | |
| Cyanide Total | 0.0032 | 0.0029B | 0.003 | 0.0032 | 2 |
| Fluoride | ND | ND | ND | | 4 |
| | | | | | |
| Alpha, pCi/l ** | 0.2 | 0.8 | 0.5 | 0.8 | |
| Beta, pCi/l ** | 0.9 | 0.5 | 0.7 | 0.9 | |
| Tritium, pCi/l | 243.3 | 150.2 | 196.75 | 243.3 | |

# TABLE 2

## METALS RESULTS

| | Months of Operation 2002 | | | | |
|---|---|---|---|---|---|
| | January | March | | | |
| **Metals, ug/L** | | | **Average** | **Maximum** | **MCL** |
| Aluminum | U | U | U | U | |
| Antimony | U | U | U | U | 6 |
| Arsenic | U | U | U | U | 50 |
| Barium | 0.61B | 0.78B | 0.70B | 0.78B | 1000 |
| Beryllium | 0.6B | U | U | U | 4 |
| Cadmium | U | U | U | U | 100 |
| Calcium | 128B | 209B | 168B | 209B | |
| Chromium | U | 2.5 | 1.32 | 2.5 | 50 |
| Cobalt | U | U | U | U | |
| Copper | 0.87B | 394 | 197 | 394 | |
| Iron | 236 | 343 | 290 | 343 | |
| Lead | 8.2 | 22 | 15 | 22 | 50 |
| Lithium | U | U | U | U | |
| Magnesium | 79.3B | 141B | 110 | 141B | |
| Manganese | 4.8B | 8 | 6.4 | 8 | |
| Mercury | U | U | U | | 2 |
| Molybdenum | U | U | U | U | |
| Nickel | U | U | U | U | 100 |
| Potassium | 813B | U | 581B | 813B | |
| Selenium | U | U | U | U | 10 |
| Silver | U | 1.3 | 0.76 | 1.3 | 50 |
| Sodium | U | U | U | U | |
| Strontium | 1.8B | 2.4B | 2.1B | 2.4B | |
| Thallium | U | 3.3BJ | 2.4JB | 3.3BJ | 2 |
| Tin | U | 9.9 | 5.5 | 9.9 | |
| Uranium | U | U | U | U | |
| Vanadium | U | U | U | U | |
| Zinc | U | 206J | 105J | 206J | |

U= Result is less than the instrument detection limit (IDL)

B= Estimated result. Result is less than RL and greater than or equal to the IDL.

RL= Reporting limit.

J= Method blank contamination. The associated blank contains the target analyte at a reportable level

# TABLE 3

## VOLATILE ORGANIC ANALYSES

| | Months of Operation 2002 | | | |
|---|---|---|---|---|
| | January | March | | |
| **Volatile Organics, ug/L** | | | **Average** | **MCL** |
| Chloromethane | U | U | U | |
| Bromomethane | U | U | U | |
| Vinyl Chloride | U | U | U | 2 |
| Chloroethane | U | U | U | |
| Methylene Chloride | U | U | U | 5 |
| 1,1-Dichloroethene | U | U | U | 7 |
| 1,1-Dichloroethane | U | U | U | |
| Chloroform | U | U | U | |
| 1,2-Dichloroethane | U | U | U | 5 |
| 1,1,1-Trichloroethane | U | U | U | 200 |
| Carbon Tetrachloride | U | U | U | 5 |
| Bromodichloromethane | U | U | U | |
| 1,2-Dichloropropane | U | U | U | 5 |
| cis-1,3-Dichloropropene | U | U | U | |
| Trichloroethene | U | U | U | 5 |
| Dibromochloromethane | U | U | U | |
| 1,1,2-Trichloroethane | U | U | U | 5 |
| Benzene | U | U | U | 5 |
| trans-1,3-Dichloropropene | U | U | U | |
| Bromoform | U | U | U | |
| Tetrachloroethene | U | U | U | 5 |
| 1,1,2,2-Tetrachlororethane | U | U | U | |
| Toluene | U | U | U | 1000 |
| Ethylbenzene | U | U | U | 700 |
| Trichlorofluoromethane | U | U | U | |
| trans-1,2-dichloroethene | U | U | U | 100 |
| 2-Chloroethylvinyl either | U | U | U | |
| Chlorobenzene | U | U | U | 100 |
| 1,3-Dichlorobenzene | U | U | U | |
| 1,4-Dichlorobenzene | U | U | U | 75 |
| 1,2-Dichlorobenze | U | U | U | 600 |
| Dichlorodifluoromethane | U | U | U | |

U= Undetected

# TABLE 4

## SEMIVOLATILE ORGANICS

| | Months of Operation 2002 | | | |
|---|---|---|---|---|
| | January | March | | |
| **Semivolatile organics, ug/L** | | | **Average** | **MCL** |
| Phenol | U | U | U | |
| bis (2-Chloroethyl) ether | U | U | U | |
| 2-Chlorophenol | U | U | U | |
| 1,3-Dichlorobenzene | U | U | U | |
| 1,4-Dichlorobenzene | U | U | U | |
| Benzyl alcohol | U | U | U | |
| 1,2-Dichlorobenzene | U | U | U | |
| 2-Methylphenol | U | U | U | |
| bis (2-chloroisopropyl) ether | U | U | U | |
| 4-Methylphenol | U | U | U | |
| n-Nitroso-di-n-propylamine | U | U | U | |
| Hexacholorethane | U | U | U | |
| Nitrobenzene | U | U | U | |
| Isophorone | U | U | U | |
| 2-Nitrophenol | U | U | U | |
| 2,4-Dimethylphenol | U | U | U | |
| Benzoic Acid | U | U | U | |
| bis (2-Chloroethoxy) methane | U | U | U | |
| 2,4-Dichlorophenol | U | U | U | |
| 1,2,4-Trichlorobenzene | U | U | U | 70 |
| Naphthalene | U | U | U | |
| 4-Chloroaniline | U | U | U | |
| Hexachlorobutadine | U | U | U | |
| 4-Chloro-3-methylphenol | U | U | U | |
| 2-Methylnaphthalene | U | U | U | |
| Hexachlorocyclopentadiene | U | U | U | 50 |
| 2,4,6-Trichlorophenol | U | U | U | |
| 2,4,5-Trichlorophenol | U | U | U | 50 |
| 2-Chloronaphthalene | U | U | U | |
| 2-Nitroaniline | U | U | U | |
| Dimethylphthalate | U | U | U | |
| Acenaphthylene | U | U | U | |
| 2,6-Dinitrotoluene | U | U | U | |

U= Undetected

## TABLE 4 (CONTINUED)

## SEMIVOLATILE ORGANICS

| | Months of Operation 2002 | | | |
|---|---|---|---|---|
| | January | March | | |
| Semivolatile organics, ug/L | | | Average | MCL |
| 3-Nitroaniline | U | U | U | |
| Acenaphthene | U | U | U | |
| 2,4-Dinitrophenol | U | U | U | |
| 4-Nitrophenol | U | U | U | |
| Dibenzofuran | U | U | U | |
| 2,4-Dinitrotoluene | U | U | U | |
| Diethylphthalate | U | U | U | |
| 4-Chlorophenyl-phenylether | U | U | U | |
| Fluorene | U | U | U | |
| 4-Nitroaniline | U | U | U | |
| 4,6-Dinitro-2-methylphenol | U | U | U | |
| n-Nitrosodiphenylamine | U | U | U | |
| 4-Bromophenyl-phenylether | U | U | U | |
| Hexachlorobenzene | U | U | U | 1 |
| Pentachlorophenol | U | U | U | 1 |
| Phenanthrene | U | U | U | |
| Anthracene | U | U | U | |
| Di-n-butylphthalate | U | U | U | |
| Fluoranthene | U | U | U | |
| Pyrene | U | U | U | |
| Butylbenzylphthalate | U | U | U | |
| 3,3'-Dichlorobenzidine | U | U | U | |
| Benzo [a] anthracene | U | U | U | |
| Chyrsene | U | U | U | |
| bis (2-Ethylhexyl) phthalate | U | 6.0JB | 6.0JB | |
| Di-n-octylphthalate | U | U | U | |
| Benzo [b] fluoranthene | U | U | U | |
| Benzo [k] fluoranthene | U | U | U | |
| Benzo [a] pyrene | U | U | U | 0.2 |
| Indeno [1,2,3-cd] pyrene | U | U | U | |
| Dibenz [a,h] anthracene | U | U | U | |
| Benzo [g,h,I] perylene | U | U | U | |
| Carbazole | U | U | U | |

U= Undetected

B= Analyte found in the sample and the blank

J= Estimated value above the MDL but below the contract required detection level.

## TABLE 5

## INFLUENT WASTE STREAMS FOR B374

| SOURCE | NATURE OF THE WASTEWATER | VOLUME, GAL. |
|---|---|---|
| B371 | Utilities Water, Caustic Waste Treatment | 1906 |
| B428 Sump | Ground water | 0 |
| B444 | Utilities water, ground water, condensate leaks | 0 |
| B559 | Laboratory waste | 1183 |
| B707 | Utilities water | 4186 |
| B774 | Tank and line draining, condensate, ground water | 10053 |
| B776 | Tank and line draining, condensate | 3137 |
| B891 | Regeneration solution from treatment process | 9698 |
| B374 | Pump leaks, process water, chiller water | 26645 |
| | Ground Water | 0 |
| | Rain Water | 1330 |

# SECTION 2

# BUILDING 995 INTERNAL WASTE STREAMS

## CERTIFICATION STATEMENT FOR THE BUILDING 995 INTERNAL WASTE STREAMS

We certify under penalty of law that this document and all attachments were prepared under our direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on our inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of our knowledge and belief, true, accurate, and complete. We are aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

James L. Williams
General Manager
Rocky Flats Closure Site Services, L.L.C.

2/12/03
Date

Dennis W. Ferrera
Vice President and Project Manager
Remediation, Industrial D&D and Site Services
Kaiser-Hill Company, L.L.C.

2/12/03
Date

# Annual Routine Internal Waste Streams Report

## Active Routine IWS Discharges to RFETS WWTP

*Report for dates from:* 1/1/02 *to:* 12/31/02

| Building Number | Waste Stream Description | Discharge Volume (Gal/yr) |
|---|---|---|
| 122 | Water used in X-ray development | 250 |
| 122 | Developer systems cleaner "Cronex" | 60 |
| 122 | Developer "Cronex" | 375 |
| 124 | D-1 Pit water with low level diesel contamination | 12600 |
| 124 | Process water samples tested for pH, chlorine & turbidity | 2000 |
| 331 | Wash water and detergents, fuels, fluids, oils, grease | 1000 |
| 331FD | Floor wash water | 10000 |
| 331FD | Hose wash water | 10000 |
| 331FD | Truck wash water | 10000 |
| 371 | Condensate Return System 1, 2, and 3 for Building 371. | 35000 |
| 371 | E910 Heat Exchangers Quarterly Emergency Generator Load Test | 48000 |
| 373 | Cooling tower blowdown | 300000 |
| 440 | Steam heating system-condensate water | 600 |
| 559 | Air compressor condensate with neg amt synthetic oil | 100 |
| 566 | Respirator washer waste water with detergents & bleach | 15200 |
| 664 | Steam heating system-condensate water | 12000 |
| 664 | Rinsing water from 'Zamboni' tank | 2000 |
| 707 | B707 HVAC condensate water | 35000 |
| 708 | Cooling water leakage & NALCO, corrison inhibitor | 10 |
| 708 | Air compressor condensate with trace amount coolant. | 750 |
| 711 | Cooling tower blowdown | 182500 |
| 776 | Condensate from cooling system | 80000 |
| 991 | Suppy fan #3; Cooling Tower Supply Fan for Air Conditioning system. | 1000 |
| 991 | Water from air compressor | 50 |
| T130G | Previously described as WSRIC ID#850-3-4 | 1 |
| T130G | 'Photochemicals'. Previously identified as WSRIC 850-2-1 | 65 |
| T130G | Photo lab 'Process Water' in room 68. Previously WSRIC 850-2-3 | 16 |
| T130G | Previously described as WSRIC ID#850-3-3 | 20 |
| T865G | Water from laundering of modesty clothing for 865. | 20000 |
| | *Annual Routine IWS Discharge Volume to RFETS WWTP* | **778,597** |

# SECTION 3

# EVALUATION OF INFILTRATION AND INFLOW

## CERTIFICATION STATEMENT FOR THE EVALUATION OF INFILTRATION AND INFLOW

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Dennis W. Ferrera

Dennis W. Ferrera
Vice President and Project Manager
Remediation, Industrial D&D and Site Services
Kaiser Hill Company, L.L.C.

3/23/03
Date

# EVALUATION OF INFILTRATION AND INFLOW AT THE ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE WASTEWATER TREATMENT PLANT FOR CALENDAR YEAR 2002

## 1 INTRODUCTION

The Rocky Flats Environmental Technology Site (RFETS or the Site) is served by a small activated sludge wastewater treatment plant (WWTP) and a sanitary collection system with over 40,000 feet of pipe. The plant operations and discharges are regulated by a National Pollutant Discharge Elimination System (NPDES) permit issued by the Environmental Protection Agency (EPA) and certified by the State of Colorado. Among the permit requirements is an annual report of impacts of infiltration and inflow (I&I) on the WWTP, also known as Building 995 (B995). The first of these reports (DOE, March 2002) covered calendar year 2001 (CY01); this is the second report and covers calendar year 2002 (CY02).

As described in the CY01 evaluation, the Site reported a single event at the WWTP that was outside permit limitations (one elevated level of nitrite), and it was not attributable to the effects of increased flows from infiltration and inflow. Data from CY01 evaluated for the first report included daily flows at both the discharge of B995 and at Building 990, a former equalization facility upstream of B995, and the Site's precipitation record for the year. A simple comparison of wet months' to dry months' flow suggested that I&I in the RFETS collection system could range from 20% to 40% of the flow. The report concluded that even with the worst-case-scenario of 40% I&I, the WWTP operated well and was not adversely impacted by I&I.

The approach for the 2002 report is similar to that for 2001, comparing flow and precipitation records. For this report, other Site records are being compared as well, and a year-to-year comparison is made with the 2001 records. The year 2002 offers a great opportunity to look closer at the impacts of precipitation events, since there was so little precipitation in what is being reported as one of the worst drought years in several centuries. Based on Site records, 38% less precipitation fell in CY02 compared to CY01 (7.94 in. in 2002 vs 12.74 in. in 2001).

In calendar year 2002, the RFETS WWTP performed well, treating approximately 50 million gallons to meet all applicable effluent limitations with one exception – mechanical failures in March led to elevated nitrite concentrations above the permitted limit of 4.5 mg/L. Elevated nitrite was reported in the monthly Discharge Monitoring Reports (DMR) for March and April. In early March, severe cold weather caused damage to the number 2 clarifier, followed closely by the failure of the number 2 aeration basin blower. While the blower was repaired immediately, new parts for the clarifier had to be custom fabricated, which took several weeks. While the repairs were underway, process flow was shifted from the number 2 train to the number 1 train, which is

normally kept in stand-by mode for just such situations. The number 1 train has a smaller capacity than the number 2 train, which may have contributed to a shift in nitrogen species and the excess nitrite. Plant operators were able to exert control over the unit processes to prevent extended periods of nitrite production. Repairs were completed in April, and no further problems were encountered.

In addition to the routine monthly reporting of plant operating conditions and effluent quality, quarterly acute Whole Effluent Toxicity (WET) tests and semiannual chronic WET tests are conducted. Six results were reported for 2002, with no toxicity events reported. Monthly removal efficiencies for total suspended solids (TSS) and carbonaceous biochemical oxygen demand (CBOD) are also reported; the NPDES permit requires a minimum of 85% removal. In 2002, this requirement was met consistently throughout the year.

## 2 BACKGROUND

The Site's sanitary collection system flows down gradient from west to east across the industrial area. Two sub-basins of the collection system join at Building 990 (B990) where the original equalization basins are also located. The north sub-basin served that portion of the plant formerly located within the Protected Area (PA). The south sub-basin collects sanitary flow from the rest of the plant exterior to the PA. The PA was reconfigured in 2001, reduced in size to an area surrounding Building 371/374. From B990, wastewater flows into one of three 110,000 gallon influent storage tanks at B995. While one tank is filling, another tank holding the previous day's flow is being processed. Operators are present during daylight hours only, so the plant is normally processing influent collected during the previous day/night cycle. The influent tanks now provide flow equalization to a greater extent than the older and smaller 60,000 gallon tanks at B990.

Collection system flow is monitored at B990 just before the north and south side flows combine. Sonic transducers measure water levels behind plywood barriers which serve as rudimentary sharp crested weirs. The electronic measurements made by the transducers are sent to the control room at the wastewater plant, where daily total flow volumes are estimated and recorded. B990 flow data are not used for operational purposes. As a result, the transducers are not included in the Site's routine calibration procedure, and the totalizer data are collected for general information purposes only.

In 1996, the Department of Energy (DOE) signed the Rocky Flats Cleanup Agreement (RFCA) with EPA and the Colorado Department of Public Health and Environment (CDPHE). RFCA requires an integrated approach to environmental monitoring at the site and specified the development of the Integrated Monitoring Plan (IMP). The IMP describes monitoring activities at the Site and establishes a procedure whereby conditions of interest to stakeholders can be investigated through new monitoring efforts. The IMP is updated annually. As part of the development of the IMP, an interest in the rates of infiltration and inflow led to the inclusion of a decision rule crafted to utilize flow

measurements at B990. The first step in this evaluation was to establish a base flow for the two sub-basins within the collection system using the totalizer readings; the CY01 I&I report provided the first set of readings. This report includes the B990 data collected in CY02. There has been no change in the status of monitoring equipment at B990, so these data are provided for information purposes only, and are in no way connected with flow data collected as required by the Site's NPDES permit.

NPDES-required flow monitoring is conducted at the wastewater treatment plant. Daily effluent flows are measured with a routinely calibrated V-notch weir located immediately downstream of the ultraviolet disinfection step. This location is designated as Outfall STP1 in the current permit. For purposes of the I&I evaluation, daily flows as reported from STP1 were compared to the Site's record of precipitation events and several other parameters measured at the wastewater treatment plant.

## 3 METHODS

As reported for CY01, there had been a limited video examination of portions of the sanitary collection system in 1999 and 2000. Based on the overall good repair of the transmission lines observed in that effort, no additional video assessments have been made. The methods used to collect data for the CY02 assessment are the same as reported in the CY01 report, flow measurement at B995 and B990, and comparison with recorded precipitation at RFETS. CY02 was noteworthy as a year of severe drought. Paleodendrochronology records compiled and evaluated by the City of Boulder demonstrated that the last time this region had so little rainfall was 1723 (City of Boulder, 2002)

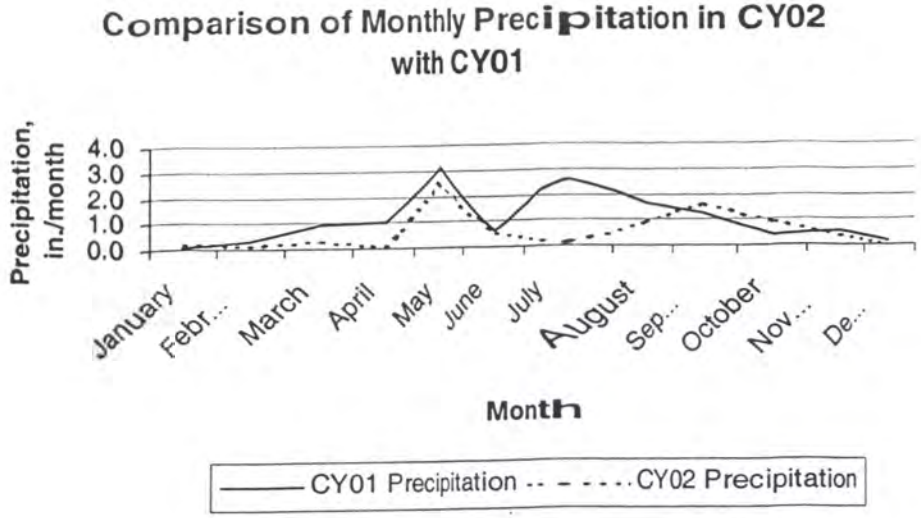
## 4 RESULTS

### 4.1 Observations In The Collection System

Because previous investigations using video equipment to examine the collections system indicated that the system is in generally good repair, no further examinations were scheduled in CY02. Manholes and other potential points of entry for storm water inflow were maintained in good order to minimize the entry of runoff.

Within the general area of the RFETS plant site, precipitation was measured and recorded at RFETS monitoring stations. Figure 1 shows the average monthly precipitation, in inches, in CY02 compared to the same measurements in CY01. This figure clearly shows the effects of the CY02 drought, although regional records suggest that Colorado has been in the grips of a long term drought for at least the past three years (Boulder 2002).

**Figure 1 Comparison of Monthly Precipitation in CY02 with CY01**




## 4.2 Flow Observations At Building 995

Daily flow readings are collected at B995 for operational and reporting purposes. The monthly Discharge Monitoring Reports, submitted to EPA and CDPHE, contain the average daily flow for each reporting period. Those data for CY02 are presented graphically in Figure 2, with a comparison to the average monthly precipitation, and are provided in tabular form in Table 1.

**Figure 2 B995 Effluent Flow and Precipitation**

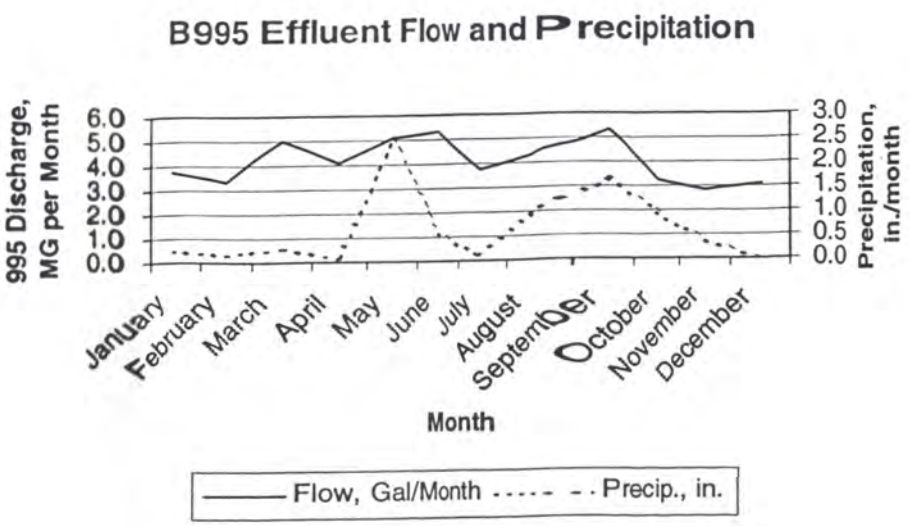
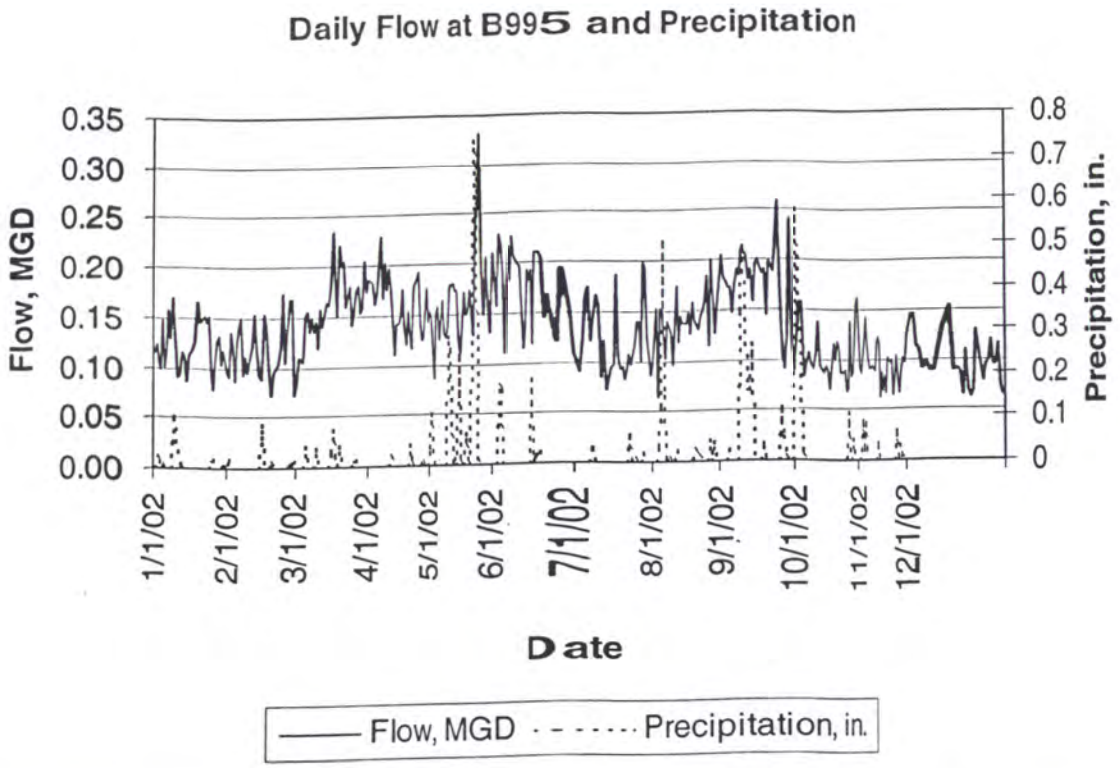


**Table 1 – Summary Of Monthly B995 Flow And Precipitation for CY02**

| MONTH | TOTAL FLOW, MILLION GALLONS (MG) | PRECIPITATION, IN. |
|---|---|---|
| January | 3.738 | 0.252 |
| February | 3.336 | 0.152 |
| March | 4.970 | 0.312 |
| April | 4.857 | 0.083 |
| May | 5.073 | 2.492 |
| June | 5.334 | 0.573 |
| July | 3.783 | 0.119 |
| August | 4.297 | 0.965 |
| September | 5.371 | 1.651 |
| October | 3.237 | 0.956 |
| November | 2.831 | 0.387 |
| December | 3.107 | 0.000 |

As in the previous report, the daily fluctuations in discharge flow compared to daily precipitation yielded some indication as to the influence of storm events on discharge flows. For CY02, that comparison is shown in Figure 3.

**Figure 3. Daily Flow at B995 and Precipitation**



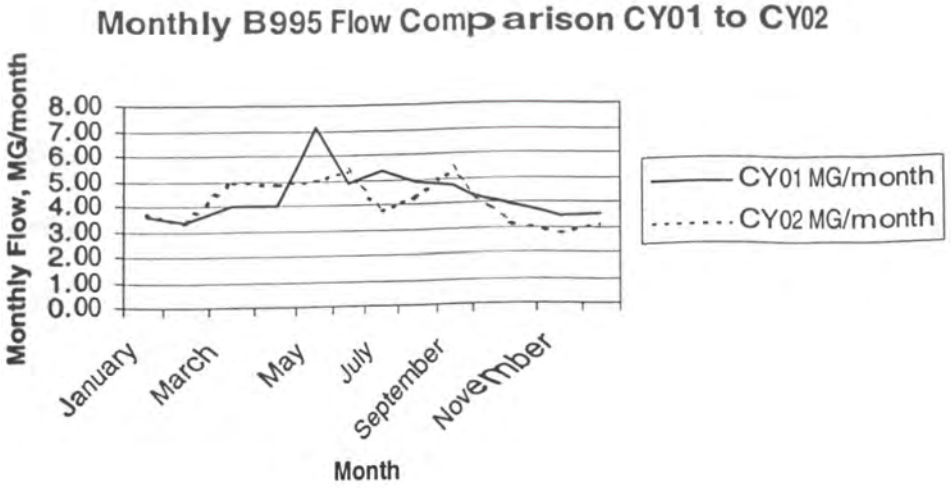

A summary of monthly flow statistics and a comparison of CY02 with CY01 is provided in Table 2

**Table 2 – Summary Statistics for Monthly Flow from B995 in CY01 and CY02**

| | CY01 | CY02 |
|---|---|---|
| Average Flow, MG/month | 4.40 | 4.10 |
| Std. Dev. | 1.09 | 0.91 |
| Minimum | 3.36 | 2.83 |
| Maximum | 7.16 | 5.37 |

Finally, monthly CY02 effluent flows from Building 995 are compared to CY01 in Figure 4. The total volume of treated effluent discharged in CY01 was about 54 MG compared to about 49 MG discharged in CY02, a reduction of about 10%.

**Figure 4 Monthly B995 Flow Comparison CY01 to CY02**




4.3 Observations At Building 990

For the reasons described above, the flow monitoring at B990 is provided for informational purposes only. It is collected in order to assist the understanding of flow conditions from the two distinct parts of the collection system, and to help identify any observable differences.

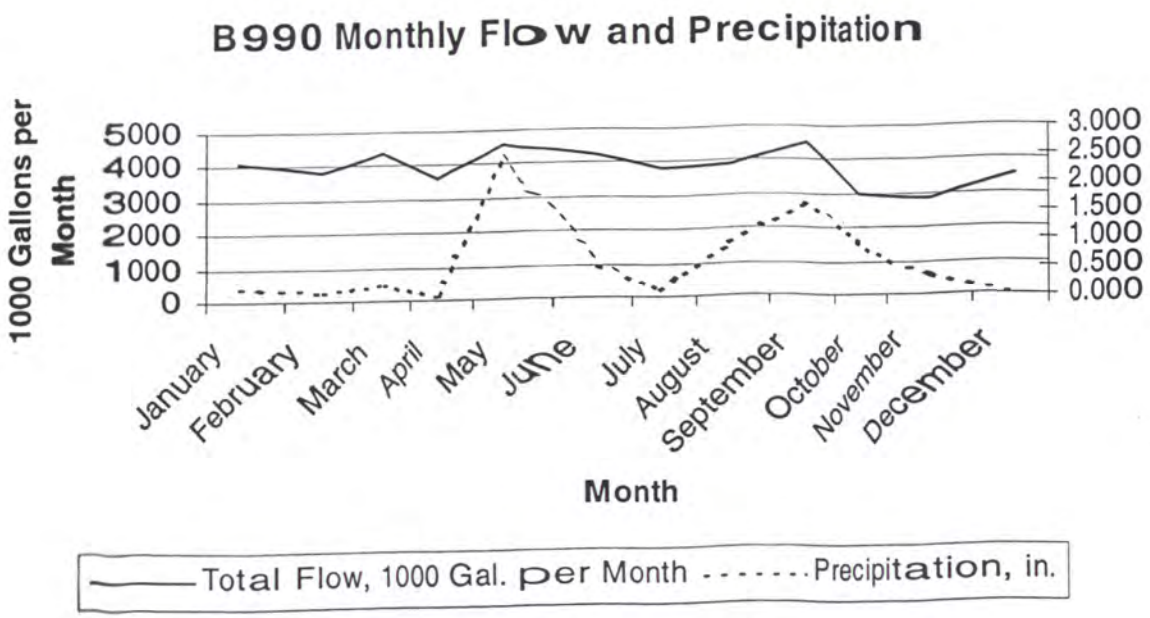
The total monthly flow at each monitoring location, the total flow, and a comparison with site precipitation is provided in Table 3.

## TABLE 3 – SUMMARY OF MONTHLY B990 FLOW AND PRECIPITATION

| MONTH | NORTH, MG | SOUTH, MG | TOTAL, MG | PREC., IN. |
|---|---|---|---|---|
| January | 1.38 | 2.72 | 4.10 | 0.25 |
| February | 1.41 | 2.43 | 3.84 | 0.15 |
| March | 1.47 | 2.87 | 4.34 | 0.31 |
| April | 0.88 | 2.76 | 3.63 | 0.08 |
| May | 1.22 | 3.39 | 4.61 | 2.49 |
| June | 1.04 | 3.18 | 4.22 | 0.57 |
| July | 0.87 | 2.95 | 3.82 | 0.12 |
| August | 1.26 | 2.62 | 3.88 | 0.97 |
| September | 2.08 | 2.42 | 4.50 | 1.65 |
| October | 0.79 | 2.22 | 3.00 | 0.96 |
| November | 0.90 | 1.92 | 2.82 | 0.39 |
| December | 1.27 | 2.28 | 3.55 | 0.00 |

The total monthly flow at B990 is compared to precipitation in Figure 5.

**Figure 5 B990 Monthly Flow and Precipitation**




## 5 EVALUATION

The RFETS WWTP performed well in 2002. Upset conditions in March were attributable to mechanical failures due to severe weather, and no operational aberrations were attributable to excessive I&I. In fact, 2002 data suggest that there was little

influence from I&I on plant flows, as might be expected in a year with extremely low precipitation. Where the CY01 data suggested a distinction between wetter and drier month flows at B995, the CY02 data suggest less variation from month to month. Peak monthly flow in CY01 was over 7 MG compared to just over 5 MG in CY02, where both years had just over 4 MG average monthly flows.

In CY01, a comparison of monthly variation suggested a range of I&I between 20% to 40%, although the variation could have been explained by increased cooling water flows in the summer months. If the monthly averages are compared to the annual average plus one standard deviation, the peak month in CY01 had a 30% increase in flow, which coincided with the heaviest precipitation event of the year. Using the same method, the comparison of monthly flows in CY02 to the annual average plus one standard deviation showed a 6% increase in flow, which occurred in June, shortly after the peak precipitation event in CY02.

These data suggest that I&I is a factor in the sanitary collection system at Rocky Flats, and that the influence of inflow is greater than that of infiltration. In fact, given the observations of good general repair in the collection system in last year's report, it is likely that infiltration at Rocky Flats contributes little to increased flows during wet weather. As for assessing I&I, it appears that the totalizer readings from B990 are also of limited value. The measured flows at B990, as shown above, mirror the measurements at B995, so there is little added information from these data.

## 6 CONCLUSIONS

Infiltration and inflow have been assessed for a second year at the Rocky Flats WWTP. The plant operated well in CY02, with one exception due to mechanical failure. The data collected this year show little increased flows, possibly up to 6%, due to inflow during precipitation events. These data do not suggest a strong infiltration component in the flows through B995. Overall, the impact of I&I on the operations of B995 in 2002 was minimal.

## 7 REFERENCES

City of Boulder 2002 Drought Response Plan

DOE March 2002 Evaluation of Infiltration and Inflow at the Rocky Flats Environmental Technology Site Wastewater Treatment Plant, Building 995.